VA/DoD CLINICAL PRACTICE GUIDELINE FOR THE MANAGEMENT OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

Guideline Summary

PRIMARY CARE

GUIDELINE KEY POINTS

Diagnosis of COPD requires spirometry.

Educational issues and smoking cessation are essential for COPD management.

Management of COPD focuses on the symptoms and adequacy of oxygenation and not on pulmonary function.

Long-term oxygen therapy (LTOT) in hypoxemic patients and smoking cessation are proven methods for prolonging life in COPD patients.

Patients with severe exacerbations should be referred to an inpatient facility for evaluation of possible admission.

Treatment of exacerbations of COPD requires the use of pharmacotherapy and, if indicated, antibiotics.

Step-wise approach to COPD pharmacological therapy is recommended to gain and maintain control of COPD symptoms.

Medication and delivery system training (inhaler technique) is essential to adherence to therapy.

Patients with COPD are vulnerable to environmental influences (e.g., altitude) and medications (e.g., beta-blockers and narcotics).

Influenza and pneumococcal vaccinations have been shown to decrease morbidity in COPD patients.

VA access to full guideline: http://www.oqp.med.va.gov/cpg/cpg.htm
DoD access to full guideline: http://www.cs.amedd.army.mil/Qmo

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NATIONAL CPG COUNCIL
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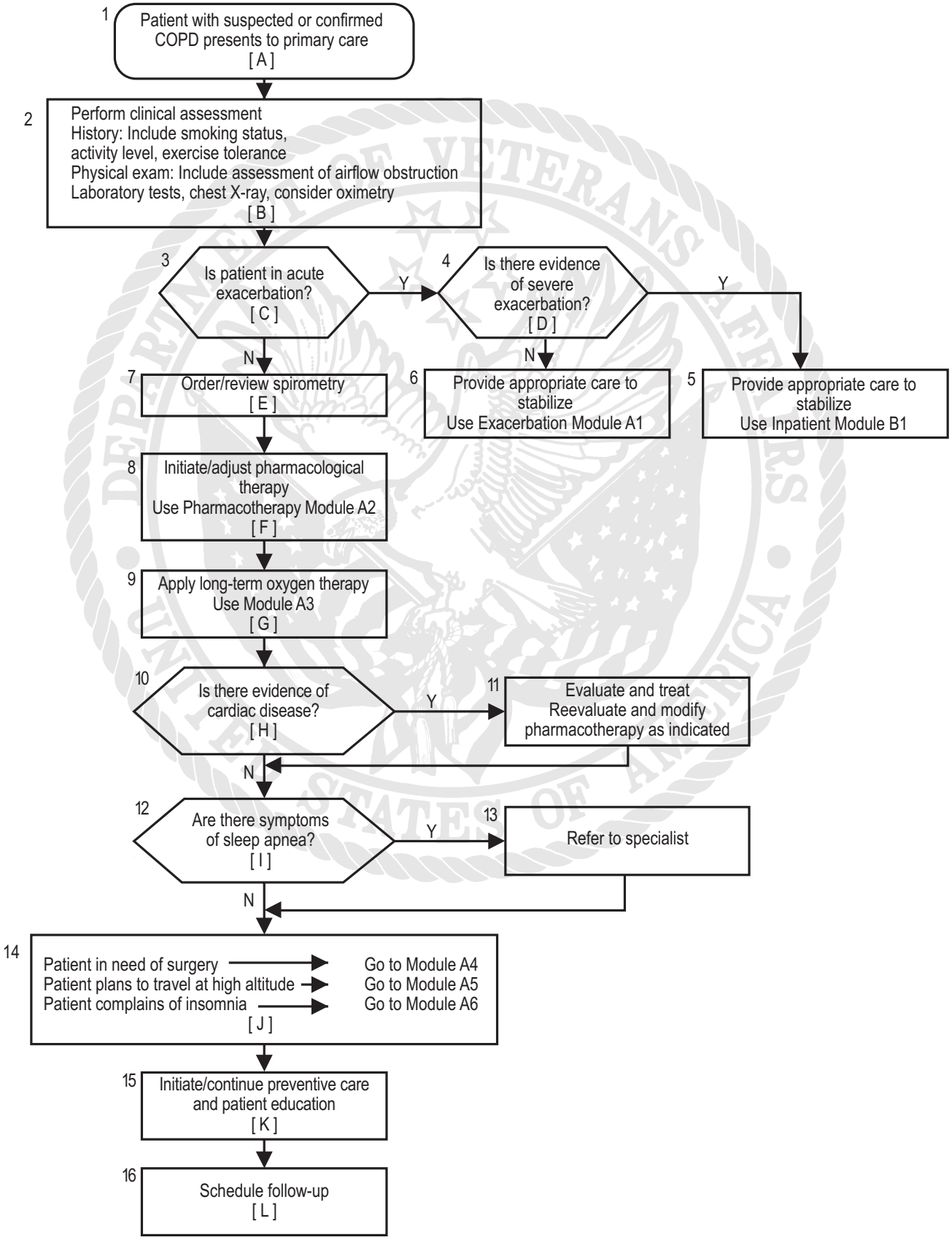
OUTPATIENT MANAGEMENT OF COPD

CORE ALGORITHM



CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

GUIDELINE SUMMARY

PRIMARY CARE

Chronic obstructive pulmonary disease (COPD) is a disorder characterized by the presence of airflow obstruction due to chronic bronchitis or emphysema; the airflow obstruction is generally slowly progressive, may be accompanied by airway hyperactivity, and may be partially reversible.

ASSESSMENT

History should include smoking, environmental, coughing, wheezing, acute chest illnesses, dyspnea, and current therapy.

Physical examination of the chest should look for mild wheezing, prolonged expiration time, low diaphragmatic position, decreased intensity of breath and heart sounds, pursed-lip breathing, use of accessory respiratory muscles, and intercostals retractions.

Laboratory tests should include:

- Spirometry for FEV_1 and vital capacity (VC)
- Chest radiography, which is diagnostic only of severe emphysema, but is essential to exclude other lung diseases.
- Oximetry to help determine if there is a need for oxygen therapy.
- $Alpha_1$-antitrypsin (AAT), although an AAT deficiency accounts for less than one percent of COPD. If an AAT deficiency is suspected, obtain a serum level.

Spirometry

On the initial visit (but not during acute exacerbation) spirometry pre- and post-bronchodilation are essential to confirm the presence and reversibility of airflow obstruction and to quantify the maximum level of ventilatory function, guide management, and estimate prognosis.

On follow up visits, repeat spirometry if major change occur in the patient's condition. For new patients, previous spirometry may be used, if available, and if there are no changes in the patient's condition. Airflow limitation is diagnosed by a reduction in FEV_1/VC.

Acute Exacerbation

An acute exacerbation of COPD is defined as an acute clinical deterioration in a patient's respiratory status due to a worsening of the underlying COPD (see the Acute Exacerbation section of this Guideline Summary or Module A1 in the full version of this guideline).

Severe Exacerbation

Loss of alertness or a combination of two or more of the following parameters indicate a severe exacerbation and suggest a need for referral to an emergency department.

- Dyspnea at rest
- Respiratory rate ≥25 per minute
- Heart rate ≥110 per minute
- Use of accessory muscles

Grading the Severity of Air Flow Obstruction

COPD can be staged on the basis of FEV_1 as *Mild, Moderate,* or *Severe*. Forced expiratory spirometry is used in the diagnosis of COPD as well as in the assessment of its severity, progression, and prognosis. The severity can be graded by the patient's percentage of predicted FEV_1. In the presence of obstruction assessed as a low FEV_1:FVC or FEV_1:VC ratio, the use of an FEV_1 less than 50 percent corresponds to a stage of moderate to severe.

Severity	FEV_1 Percent Predicted
Mild	>50
Moderate	35 to 49
Severe	<35

Consider Other Diagnoses

Consider that the patient may have coexisting sleep apnea or insomnia.

Cardiac disease from systolic or diastolic left ventricular dysfunction leading to pulmonary edema can produce symptoms similar to that of COPD, namely dyspnea, wheezing, tachycardia, and chest discomfort. Avoid the use of beta-blockers in patients with symptomatic COPD.

THERAPY

Pharmacological Step Care in COPD

Step	Symptoms and FEV_1	Therapy
1	Asymptomatic **and** FEV_1 >50% of predicted [(1)]	▪ Smoking cessation, vaccination, and employ education ▪ No medication indicated
2a	Symptoms less than daily **and** FEV_1 ≥50% of predicted [(2)]	▪ Smoking cessation, vaccination, and employ education ▪ **Inhaled short-acting beta$_2$-agonist** (2 puffs PRN up to 12 puffs/day)
2b	Asymptomatic **and** FEV_1 <50% of predicted	▪ Smoking cessation, vaccination, and employ education ▪ **Inhaled anticholinergic** (2 puffs qid) ▪ Consider use of an inhaler containing a short acting beta$_2$-agonist and an anticholinergic
2c	Symptoms less than daily **and** FEV_1 <50% of predicted **or** Daily symptoms	▪ Smoking cessation, vaccination, and employ education ▪ **Inhaled anticholinergic** (2 puffs qid) ▪ **Short-acting beta$_2$ agonist** (2 puffs PRN up to 12 puffs/day) ▪ Consider use of an inhaler containing a short acting beta$_2$-agonist and an anticholinergic
3	Symptoms not controlled [(2)]	**Increase the doses of both:** ▪ **Inhaled anticholinergic** (2 to 6 puffs qid), **and** ▪ **Inhaled short-acting beta$_2$ agonist** (2 to 4 puffs PRN up to 12 puffs/day)
4	Symptoms not controlled [(2)]	▪ Consider adding **long-acting inhaled beta$_2$-agonist** [(3)]
5	Symptoms not controlled [(2)]	▪ Consider adding a **theophylline trial** (i.e., slow release theophylline adjusted to levels of 5 to 12 µg/ml) [(4)]
6	Symptoms not controlled [(2)]	▪ Consider adding a **corticosteroid trial** (i.e., prednisone 40 to 60 mg po qd or a high dose of inhaled steroids) [(5)] ▪ Consider specialist consultation
7	Symptoms not controlled [(2)]	▪ Promptly refer to a specialist

(1) Spirometry is essential to confirm the presence of airflow obstruction (low FEV_1 and FEV_1/VC ratio). Base therapy on symptoms, but consider alternate diagnoses (e.g., heart disease and pulmonary emboli) if out of proportion to spirometry.

(2) Use the lowest level of therapy that satisfactorily relieves symptoms and maximizes activity level. Assure compliance and proper use of medications before escalating therapy.

(3) Inhaled long-acting beta$_2$-agonists should not be used as rescue therapy. Short-acting inhaled beta$_2$-agonists (i.e., less than 12 puffs/day) may continue to be used PRN. Nighttime symptoms are frequently better controlled with long-acting inhaled beta$_2$-agonists. Oral beta$_2$-agonists are associated with a higher rate of side effects and should be reserved for patients who cannot take inhaled beta$_2$-agonist medications.

(4) Theophylline should be used with caution because of the potential for severe side effects. Nighttime respiratory symptoms are frequently controlled, but theophylline may lead to insomnia. Theophylline should be discontinued if a symptomatic or objective benefit is not evident within several weeks.

(5) A corticosteroid trial of prednisone (40 to 60 mg/day) 10 to 14 days, or a high dose inhaled steroid (equivalent to 880 µg or more of fluticasone or 800 µg or more of budesonide) of 14 to 21 days can help identify patients who may benefit from long-term steroid use. Responders to oral steroids should transition to the lowest effective dose of inhaled steroids, or to the lowest effective dose of a combination of inhaled and oral steroids, if possible, to avoid the long-term complications of systemic corticosteroids. If oral steroids are used other than for an acute exacerbation, obtain spirometry prior to and after trial to confirm an objective response.

Long-Term Oxygen Therapy (LTOT)

In COPD patients with hypoxemia and cor pulmonale, treatment with LTOT may increase the life span by six to seven years. Mortality is reduced in patients with chronic hypoxemia when oxygen is administered for more than 12 hours daily and greater survival benefits have been shown with continuous oxygen administration.

The primary objective for using LTOT in patients with COPD is to improve their overall survival. To this end, patients with COPD who have maximized their other therapy and been identified as having oxygen saturations on room air of less than 90 percent or PaO_2 of <55 mm Hg or PaO_2 <60 mm Hg with signs of tissue hypoxia should be considered for LTOT.

Patients should be on maximal medical therapy and stable for 30 days before making decisions about LTOT. The benefits of LTOT may not be realized in patients who continue to smoke and have high levels of carboxyhemoglobin. Evaluation of saturation during exercise should be performed in COPD patients with dyspnea of effort.

Signs of tissue hypoxia include the following:

- Hematocrit (Hct) ≥55
- "p" pulmonale on electrocardiogram (ECG) or other evidence of pulmonary hypertension
- Impaired mental status
- Cor pulmonale

Although pulse oximetry can be used to exclude hypoxemia, measurement of resting PaO_2 after 30 minutes of breathing room air is the clinical standard for initiating LTOT. Oximetry may be used to adjust oxygen flow settings over time.

In most cases, changes in flow rate are not indicated for sleep and exercise. If there are signs of cor pulmonale despite adequate daytime oxygenation, the patient may be monitored with oximetry during sleep to determine the best sleep setting. Some patients may be candidates for oxygen-conserving devices (e.g., reservoir cannulae, demand oxygen delivery device, and transtracheal oxygen).

Patients started on oxygen therapy at the time of an exacerbation require reevaluation within one to three months when stable. For patients started when stable on maximal medical therapy, LTOT most likely represents a lifetime commitment and reevaluation every 12 months is appropriate.

PREVENTIVE CARE AND PATIENT EDUCATION

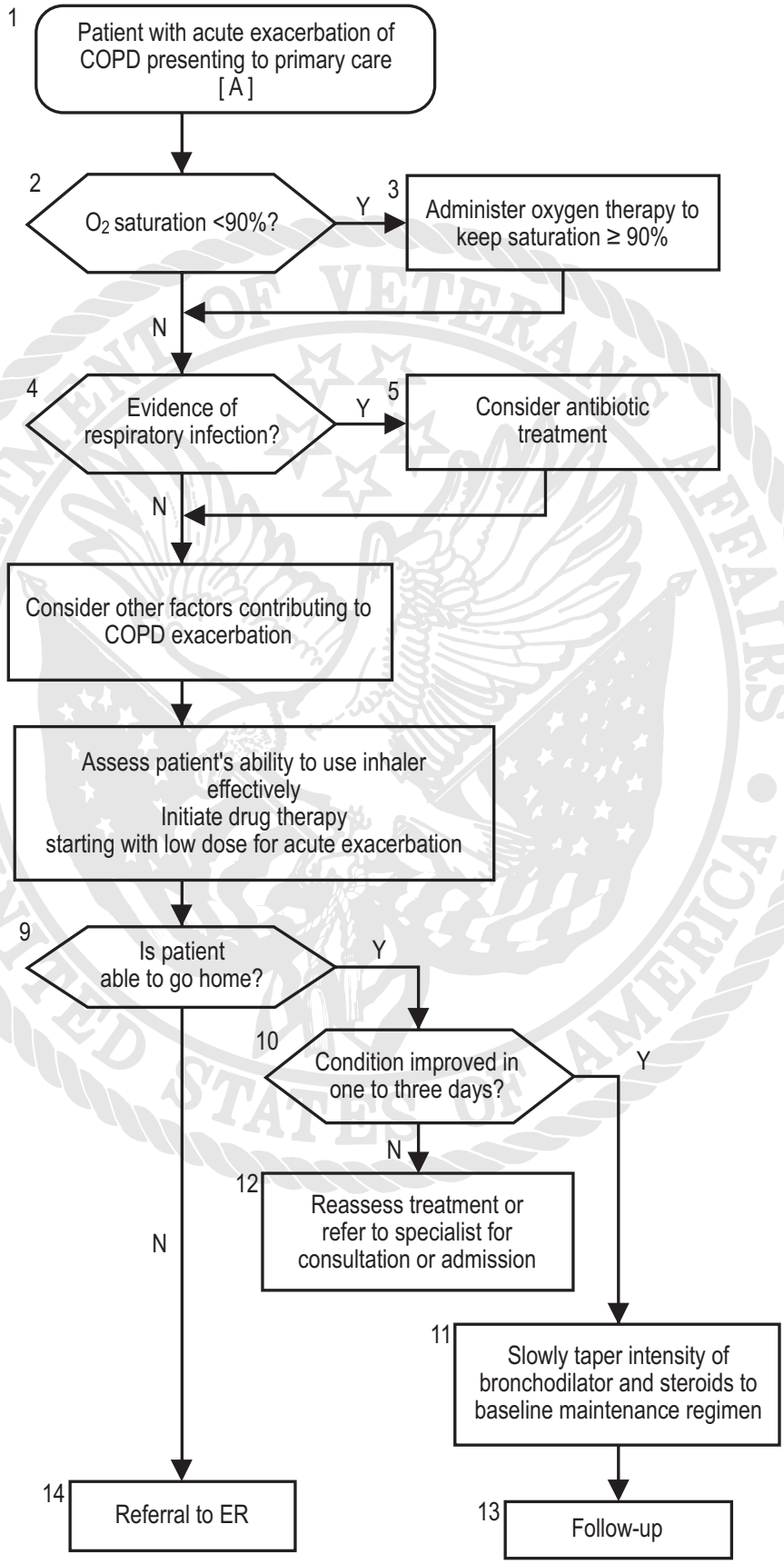
COPD Patient Education

- Smoking Cessation. All smokers should be strongly advised to quit. For additional details, see the VHA/DoD CPG for Tobacco Use Cessation and the DHHS Guidelines on Smoking Cessation (1996).
- Medication and delivery system training.
- Exercise and nutritional counseling.
- Immunizations. The Advisory Committee on Immunization Practices (CDC 1997) recommends the following:
  - —Pneumococcal vaccinations for all patients with COPD. Patients age 65 or older should be revaccinated if they were vaccinated more than five years previously. When the status of previous vaccinations is unsure, vaccination is indicated.
  - —Annual *influenza vaccinations* for individuals with chronic pulmonary disease, unless contraindicated, due to severe anaphylactic hypersensitivity to egg protein.
  - —Pneumococcal and influenza vaccinations can be administered concurrently at different sites without increasing side effects.
- Self-assessment and self-management. A pulmonary rehabilitation referral is indicated in patients on optimal medical therapy who:
  - —Continue to display moderate to severe respiratory symptoms, including dyspnea.
  - —Have had several emergency room or hospital admissions per year.
  - —Exhibit limited functional status, restricting activities of daily living.
  - —Experience impairment in quality of life.
- Occupational disabilities.
- Sexual function.

FOLLOW-UP

For mild COPD, spirometry is the test used for measuring disease progression. As the disease becomes more severe, oximetry and ABG assume greater importance. The frequency of obtaining these measures is based on clinical symptoms and status. In general, patients with mild COPD should be seen annually; moderate COPD, six months to one year, depending upon status; and severe COPD, every six months at a minimum. Spirometry should be repeated at least every two to three years to follow the progression of the disease and effects of therapy, unless there is a clinically indicated reason not to do so.

ACUTE EXACERBATION



ACUTE EXACERBATION

Acute exacerbation is defined as a recent deterioration of a previously stable patient's clinical and functional state that is due to worsening of their COPD. Typical symptoms and signs of COPD exacerbation include the following: increased dyspnea, tachycardia, increased cough, increased sputum production, change in sputum color or character, accessory muscle use, peripheral edema, development of or increase in wheeze, loss of alertness, increased respiratory rate, decrease in FEV_1 or peak expiratory flow, worsening of arterial blood gases or pulse oximetry, and chest tightness.

MANAGEMENT IN THE EMERGENCY ROOM

Acute respiratory failure not responding to initial therapy is the major indication for hospital admission. Intensive care unit (ICU) admission is indicated for respiratory failure requiring artificial ventilation or patient monitoring or to receive therapy that cannot be given otherwise. Clinical conditions that indicate respiratory failure may occur during the current exacerbation also indicate a need for admission. Once these conditions are reversed, the patient can be considered for discharge from emergent therapy or hospitalization.

ICU Admission Criteria

- Severe dyspnea that responds inadequately to initial emergency room therapy.
- Confusion, lethargy, or respiratory muscle fatigue.
- Persistent or worsening hypoxemia despite supplemental O_2 or severe or worsening of respiratory acidosis ($pH \leq 7.30$).
- Required assisted mechanical ventilation, whether through means of tracheal intubation or noninvasive techniques.

Patients not admitted to the ICU should be observed for their response to therapy and assessed if they meet admission or discharge criteria.

Discharge Criteria

- The features of the severe exacerbation are resolved.
- Anticipated need for inhaled bronchodilators is not more frequent than every 4 hours.
- Patient or caregiver understands appropriate use of medications.
- Patient, family, and physicians are confident that the patient can manage successfully.
- Follow-up and home care arrangements have been completed (e.g., visiting nurse, oxygen delivery, and meal provisions).

Patients who have not been admitted to the ICU, but do not achieve adequate control of symptoms should be admitted to the hospital ward.

Indications for Admission

- Inadequate response of symptoms to outpatient management.
- Inability to carry out activities of daily living.
- Comorbid conditions (e.g., steroid myopathy, vertebral compression fractures, pneumonia, or heart failure) that increase the risk for respiratory distress.
- Altered mentation.
- Worsening hypoxemia.
- New or worsening hypercarbia.
- New or worsening cor pulmonale unresponsive to outpatient management.
- Conclusion by the family and/or physician that the patient cannot manage at home and supplementary home care resources are not immediately available.

OXYGEN THERAPY

There is not a good relationship between spirometry and blood gases in COPD exacerbation. Oxygen (O_2) saturation should be obtained for patients with mild-to-moderate COPD exacerbations.

Patients who are stabilized after aggressive drug therapy, but continue to have hypoxemia, may require outpatient oxygen therapy at least on a temporary basis. Blood gases should be checked or oximetry performed in one month or soon thereafter when the patient is stable to determine the need for continued LTOT.

RESPIRATORY INFECTION & TREATMENT

Respiratory infection is often due to viral illness. In cases of bacterial infection, *S. pneumoniae, H. influenzae* and *M. catarrhalis* are frequent pathogens. Other organisms include *Mycoplasma* and *Chlamydia*.

Evidence of Infection

- Increased cough
- Increase in volume and changes in the color of sputum
- Increased shortness of breath
- Fever

Antibiotic Treatment

In patients with evidence of respiratory infection, a white cell count and chest X-ray may be considered. Evidence of respiratory infection with a clear chest X-ray suggests that the exacerbation of COPD is due to purulent bronchitis. Antibiotic therapy should be considered. Patients with a clinical presentation and chest radiograph consistent with pneumonia should be considered for admission.

Consider and treat other factors contributing to COPD exacerbation, in particular cardiopulmonary diseases.

PHARMACOTHERAPY

Initiate or adjust short-acting inhaled beta2-agonists (SAIBA) and inhaled anticholinergic metered dose inhalers with spacer to maximum levels, as appropriate.

MEDICATION FOR ACUTE EXACERBATION

Medication	MDI Dose	Nebulizer Dose	Special Instructions
Short Acting Beta$_2$ Agonists			Deliver medication with a nebulizer, if unable to use MDI with spacer [1].
Albuterol	3 to 4 puffs q 1/2 to 2 hours	2 mg to 5 mg q 1/2 to 2 hours	
Metaproterenol	3 to 4 puffs q 1/2 to 2 hours	10 mg to 15 mg q 1/2 to 2 hours	
Terbutaline	3 to 4 puffs q 1/2 to 2 hours	N/A	
Anticholinergics			
Ipratropium Bromide	3 to 6 puffs q 2 to 4 hours	500 µg q 2 to 4 hours	
Systemic Steroids	**Oral**		Taper off or change to qod within 1 to 2 weeks.
Prednisone	40 mg to 60 mg q day		Taper schedule for oral prednisone: Days 4 to 7: 60 mg qd; Days 8 to 11: 40 mg qd; Days 12 to 15: 20 mg qd
Prednisolone	30 mg to 50 mg q day		
	Intravenous		
Methylprednisolone	0.5 to 1.5 mg/kg If admitted, q 6 h x 72 hours		
Theophylline	If patient is on theophylline check the level.		Aim for levels of 5 to 12 µg/ml

[1] *Assess use of metered dose inhaler (MDI and spacer). Frequency and dose can be titrated as the patient's condition allows. Patient can be discharged on a minimum dose or less.*

FOLLOW-UP

Medication Maintenance

Slowly taper the intensity of medication(s) to the baseline maintenance regimen.

- Once the patient is stabilized, with improvement in the level of function, reduce intensity of the bronchodilator regimen down to the usual level of treatment over the course of a few days.
- Tapering of corticosteroids depends on the prior history of use and tapering, but often is done over one to two weeks. This can be done in consultation with the primary care provider.
- The provider should see the patient soon to ensure that the course of action is appropriate and for consideration of any further therapy such as smoking cessation, or changes in pharmacotherapy in view of the recent exacerbation.

OXYGEN THERAPY IN ACUTE EXACERBATIONS

The goal of oxygen therapy is to optimize oxygenation and minimize respiratory acidosis, if present. The nasal cannula is to be avoided initially because of its inability to deliver a precise FiO_2. Arterial blood gases (ABGs) should be obtained initially and SaO_2 should be monitored continuously. An SaO_2 of 90 percent is optimal. This usually corresponds to a PaO_2 of 55 to 60 mmHg.

Analysis of ABGs is to be used initially in all cases when it is unknown whether the patient is a chronic CO_2 retainer and to determine acid-base status. Pulse oximetry, which should be continuously monitoring SaO_2, is not sufficient until it is clear that the CO_2 level is not elevated or is stable and the acid-base status is known and is stable.

A decision to initiate mechanical ventilation and endotracheal intubation can be made prior to measuring ABGs. Advance directives should be considered prior to initiating these supportive measures.

Acceptable blood gases would include a PaO_2 close to 60 mmHg, a stable $PaCO_2$, and a pH $\geq$ 7.25.

If after initiating oxygen CO_2 retention has been, it may be difficult to reverse the rise in $PaCO_2$ and reduce acidosis without resorting to mechanical ventilation. A stepwise reduction in FiO_2 may be useful in this setting if clinical circumstances permit. An abrupt reduction in FiO_2 is unwise, since it may result in severe hypoxemia.

Once the patient is stable, efforts should be made to decrease the FiO_2, keeping PaO_2 or SaO_2 at 90 percent, and monitor oximetry and ABGs.